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The South Australian Lakes and Coorong Fishery

Greg Ferguson

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SARDI Aquatic Sciences
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February 2012

Fishery Stock Status Report for PIRSA Fisheries and Aquaculture

Government of South Australia

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1 INTRODUCTION

This is the sixth report on the status of seven species in the South Australian Lakes and Coorong Fishery (LCF), and builds on a summary report provided by Pierce and Doonan (1999) and stock status reports by Ferguson (2006a, b; 2008; 2010; 2011).

This report assesses the status of the Lakes and Coorong Fishery against the performance indicators (PI) prescribed in the Management Plan for the South Australian Lakes and Coorong Fishery (Sloan 2005). All data considered are fishery-dependent and where available, estimates of recreational catch (Rec.) are included (Henry and Lyle 2003; Jones and Doonan 2005, Jones 2009). Estimates of catch from the Marine Scalefish Fishery (MSF) are also included for pipi and mulloway. Species considered are those prescribed in the management plan; black bream, golden perch, greenback flounder, mulloway, pipi, and yellow-eye mullet. Bony bream are also included in this report at the request of PIRSA Fisheries and Aquaculture, although there are no biological performance indicators prescribed for this species in the Management Plan (Anon, 2005; Sloan 2005).

Fisheries statistics for each species are presented by financial year for the 27-year period from 1984-85 to 2010-11. Estimates of total catch are presented, as well as targeted catch, targeted effort and targeted CPUE for the dominant gear types. Finally, the status of the fishery is assessed based on comparison of the PIs and their associated reference points (RP) in the Management Plan (Sloan 2005). PIs and RPs were derived from catch and effort data for separate reference periods for finfish species (1984-85 to 2001-02) and pipi (1990-91 to 2000-01) (Sloan 2005). Upper and lower RPs for catch and CPUE were estimated from highest and lowest values during the reference period. Upper and lower trend (rate-of-change) PIs for catch and CPUE were estimated from the highest and lowest slope of the linear relationships for 3 (pipi) or 4 year (finfish) periods within the reference period (Sloan 2005).

The data presented in this report must be considered within the context of the Management Plan (Sloan 2005) and the stock assessment reports for each species (Table 1.1).

Table 1.1. List of most recent stock assessment for key species in the Lakes and Coorong Fishery.

Species	Year of most recent stock assessment	Reference
Black bream (*Acanthopagrus butcheri*)	2008	Ferguson and Ye (2008)
Golden perch (*Macquaria ambigua*)	2004	Ye (2004)
Greenback flounder (*Rhomosolea tapirina*)	2007	Ferguson (2007)
Mulloway (*Argyrosomus japonicus*)	2011	Ferguson and Ward (2011)
Multi-species assessment of Lakes and Coorong Fishery	2010	Ferguson et al (2010)
Pipi (*Donax deltoides*)	2006	Ferguson and Mayfield (2006)
Yellow-eye mullet (*Aldrichetta forsteri*)	2005	Higham et al (2005)

2 FISHERY STATISTICS

2.1 Black bream (*Acanthopagrus butcheri*)

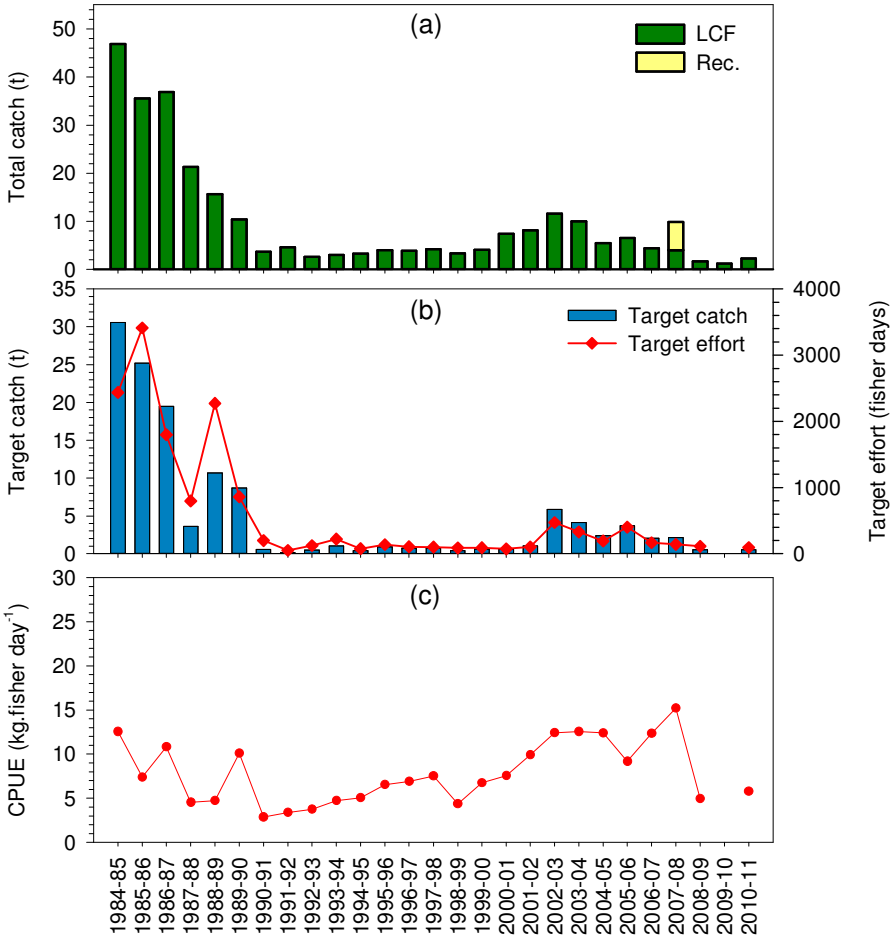

Figure 2-1. Inter-annual trends in catch and effort for black bream between 1984-85 and 2010-11 showing: (a) total catch; and for large mesh gill nets (b) target catch, target effort, and (c) CPUE. There was no targeted catch in 2009-10 Estimate of recreational catch available for 2007-08 only.

Table 2-1. Performance indicators for black bream and current status levels for 2010-11 (yellow shading highlights biological performance indicator below the lower reference point).

Performance Indicator	Upper reference point	Lower reference point	2010-11	Within range of reference points
Total catch (t)	47	3	2.3	N
CPUE (kg.fisher day^{-1})	12	3	5.8	NA
4-year total catch trend (t.year^{-1})	15	-15	-0.6	Y
4-year CPUE trend (kg.fisher day^{-1})	4	-4	-2.6	NA

2.2 Golden perch (*Macquaria ambigua*)

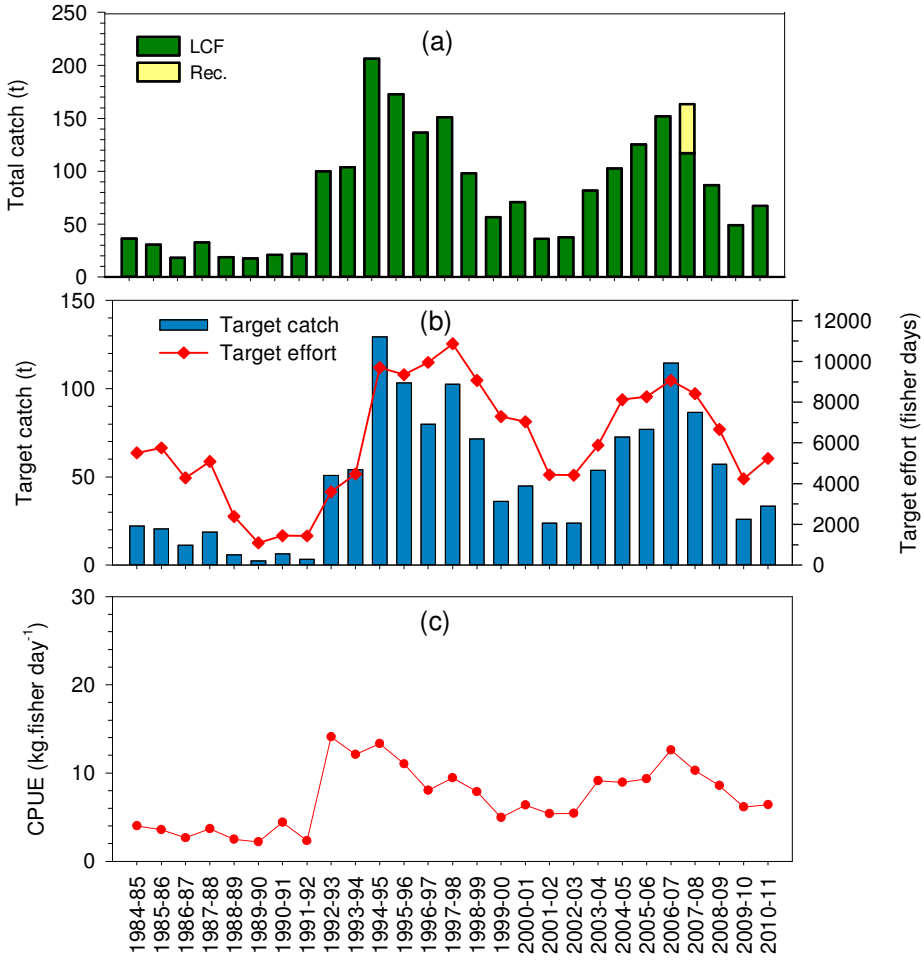

Figure 2-2. Inter-annual trends in catch and effort for golden perch between 1984-85 and 2010-11 showing: (a) total catch; and for large mesh gill nets: (b) target catch, target effort, and (c) CPUE. Estimate of recreational catch available for 2007-08 only.

Table 2-2. Performance indicators for golden perch and current status levels for 2010-11.

Performance Indicator	Upper reference point	Lower reference point	2010-11	Within range of reference points
Total catch (t)	177	20	67.4	Y
CPUE (kg.fisher day^{-1})	13	2	6.4	Y
4-year total catch trend (t.year^{-1})	56	-56	-18.7	Y
4-year CPUE trend (kg.fisher day^{-1})	4	-4	6.4	Y

2.3 Greenback flounder (*Rhombosolea tapirina*)

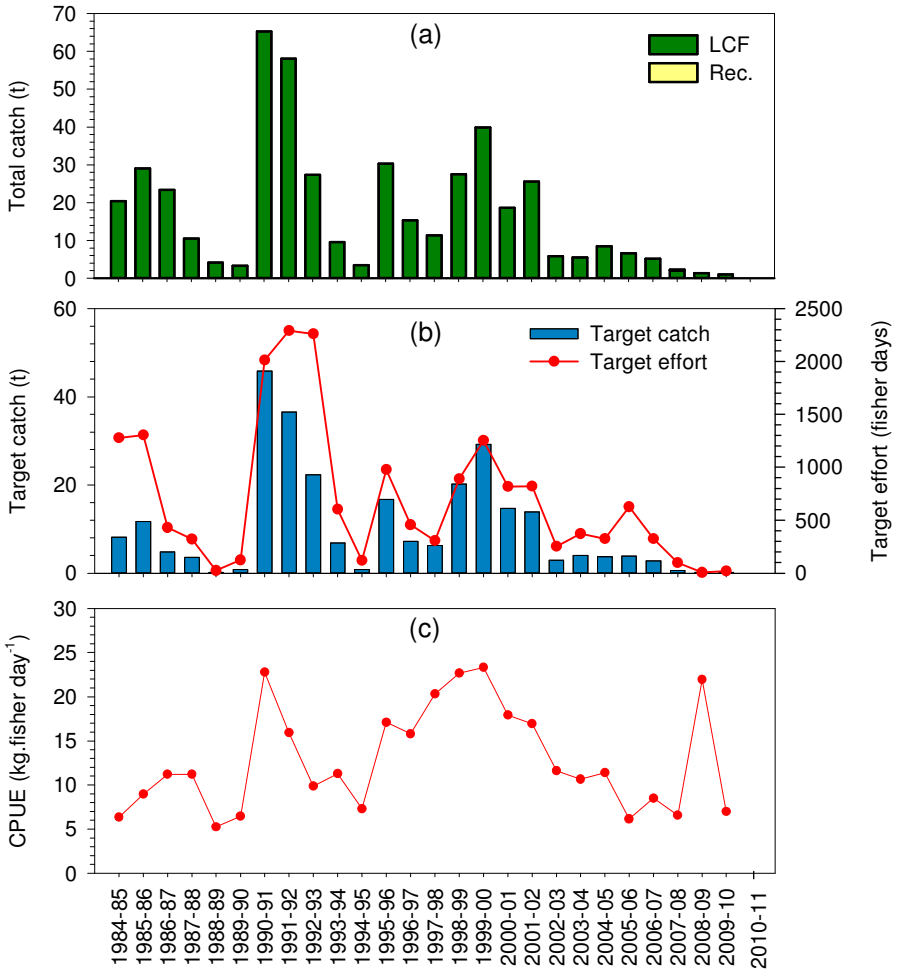

Figure 2-3. Inter-annual trends in catch and effort for greenback flounder between 1984-85 and 2010-11 showing: (a) total catch; and for large mesh gill nets; (b) target catch, target effort, and (c) CPUE. NB (1) Catch not presented for 2010-11 because the number of licences <5, (2) estimate of recreational catch available for 2007-08 only.

Table 2.3. Performance indicators for greenback flounder and current status levels for 2010-11 (yellow shading highlights biological performance indicator below the lower reference point). NB (1) Catch was not presented for 2010-11 because the number of licences was <5.

Performance Indicator	Upper reference point	Lower reference point	2010-11	Within range of reference points
Total catch (t)	54	4	NA	N
CPUE (kg.fisher day^{-1})	23	6	NA	Y
4-year total catch trend (t.year^{-1})	22	-22	-1.3	Y
4-year CPUE trend (kg.fisher day^{-1})	5	-5	NA	Y

2.4 Mulloway (*Argyrosomus japonicus*)

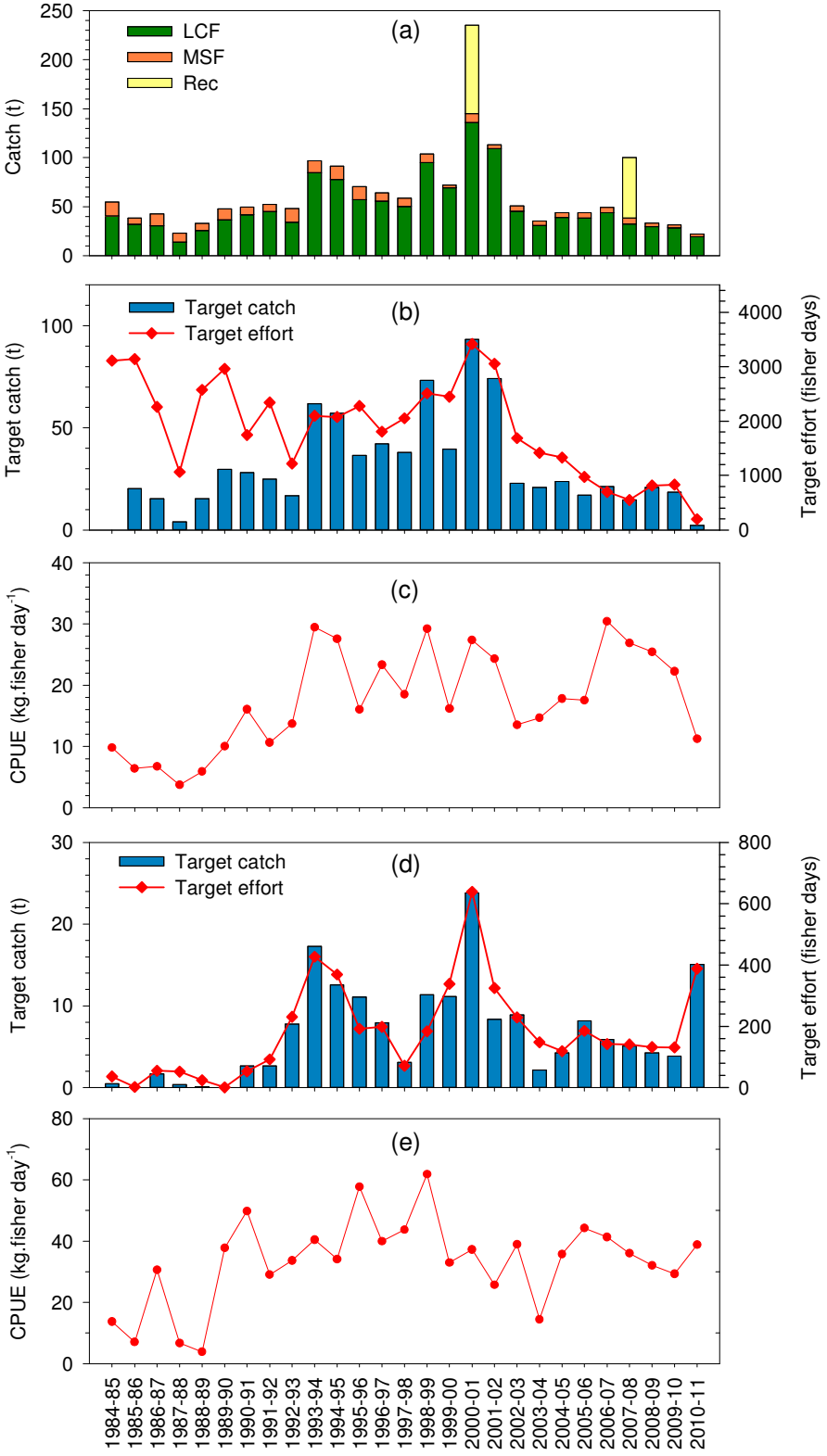

Figure 2-4. Inter-annual trends in catch and effort for mulloway between 1984-85 and 2010-11 showing: (a) total catch (MSF, LCF, recreational); and for large mesh nets; (b) target catch, target effort, and (c) CPUE. For swinger nets: (d) target catch; target effort; and (e) CPUE. Estimates of recreational catch available for 2000-02 and 2007-08 only.

Table 2-4. Performance indicators for mulloway and current status levels for 2010-11 (yellow shading highlights biological performance indicator below the lower reference point).

Performance Indicator	Upper reference point	Lower reference point	2010-11	Within range of reference points
Total catch (t)	118	31	22.0	N
Total Catch: 4-year total catch trend (t)	27	-27	-5.4	Y
Mesh net: CPUE (kg.fisher day^{-1})	28	5	11.2	Y
Mesh net: 4-year CPUE trend (kg.fisher day^{-1})	7	-7	-5.0	Y
Swinger net: CPUE (kg.fisher day^{-1})	57	6	38.8	Y
Swinger net: 4-year CPUE trend (kg.fisher day^{-1})	16	-16	0.6	Y

2.5 Pipi (*Donax deltoides*)

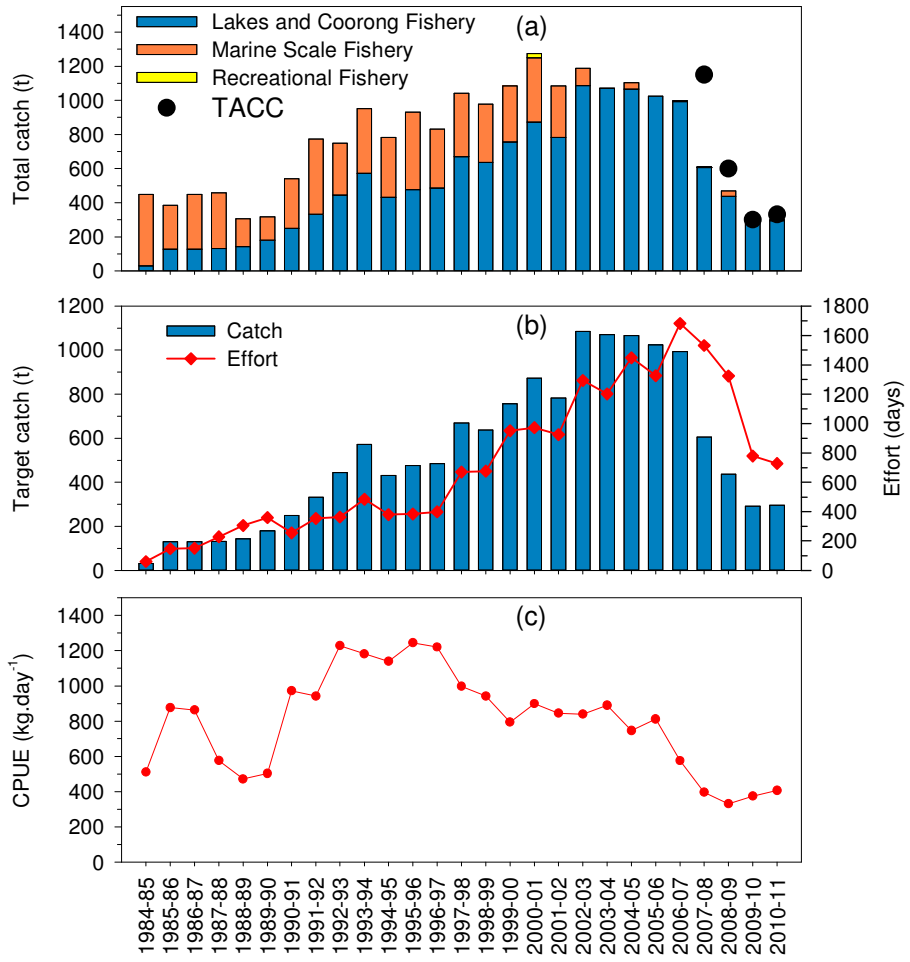

Figure 2-5. Inter-annual trends in catch and effort for pipi between 1984-85 and 2010-11 showing: (a) total catch (MSF, LCF); and for the LCF; (b) target catch, target effort, and (c) CPUE. Estimate of recreational catch was available for 2007-08 (<5 t) only. NB. Catch was constrained by the TACC in 2009-10 and 2010-11. Approx 10% of TACC was withheld for winter fishing in 2010-11.

Table 2-5. Performance indicators for pipi and current status levels for 2010-11 (yellow shading highlights biological performance indicator below the lower reference point).

Performance Indicator	Upper reference point	Lower reference point	2010-11	Within range of reference points
Total catch (t)	1500	800	299.4	N
CPUE (kg.day^{-1})	1200	850	410.6	N
3-year total catch trend (t.year^{-1})	226	-226	-85.2	N
3-year CPUE trend (kg.day^{-1})	240	-240	40.1	Y

2.6 Yellow-eye mullet (*Aldrichetta forsteri*)

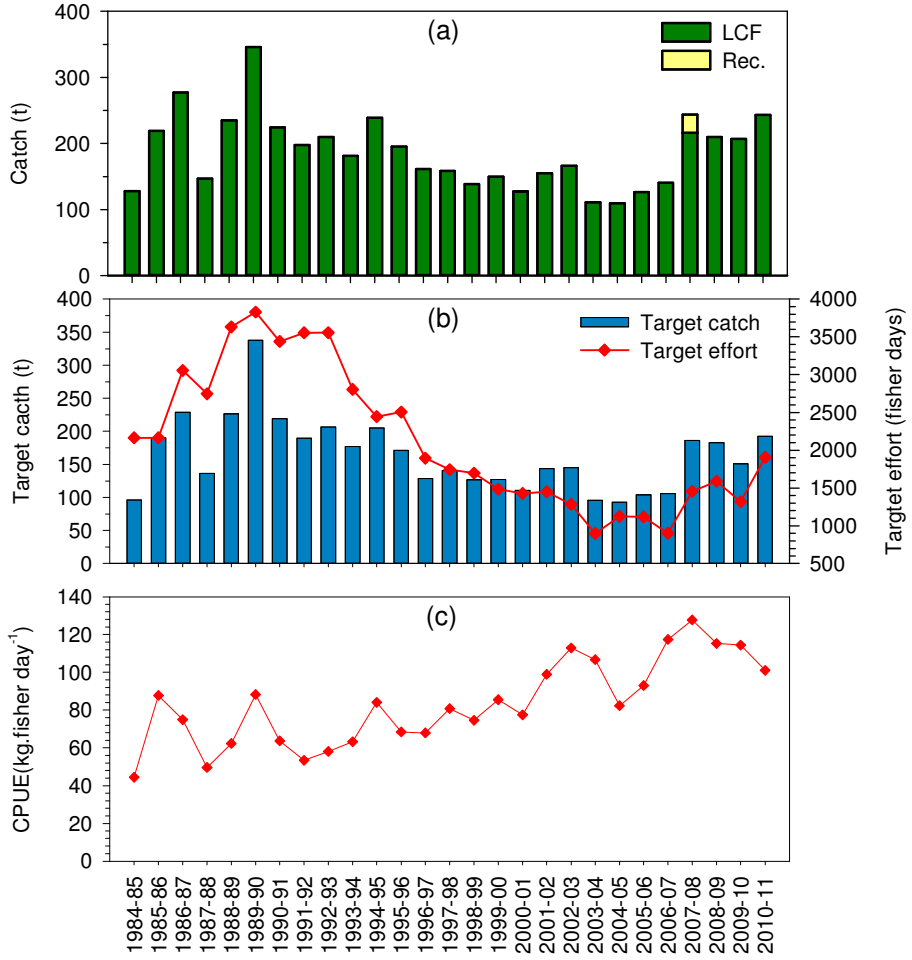

Figure 2-6. Inter-annual trends in catch and effort for yellow-eye mullet between 1984-85 and 2009-10 showing: (a) total catch (LCF, recreational); and for small mesh gill nets; (b) target catch, target effort, and (c) CPUE. Estimate of recreational catch available for 2007-08 only.

Table 2-6. Performance indicators for yellow-eye mullet and current status levels for 2010-11. (green shading highlights biological performance indicator above the upper reference point).

Performance Indicator	Upper reference point	Lower reference point	2009-10	Within range of reference points
Total catch (t)	312	124	206.8	Y
CPUE (kg.fisher day^{-1})	93	47	114.5	N
4-year total catch trend (t.year^{-1})	45	-45	19.2	Y
4-year CPUE trend (kg.fisher day^{-1})	13	-13	-2.1	Y

2.7 Bony bream (*Nematalosa erebi*)

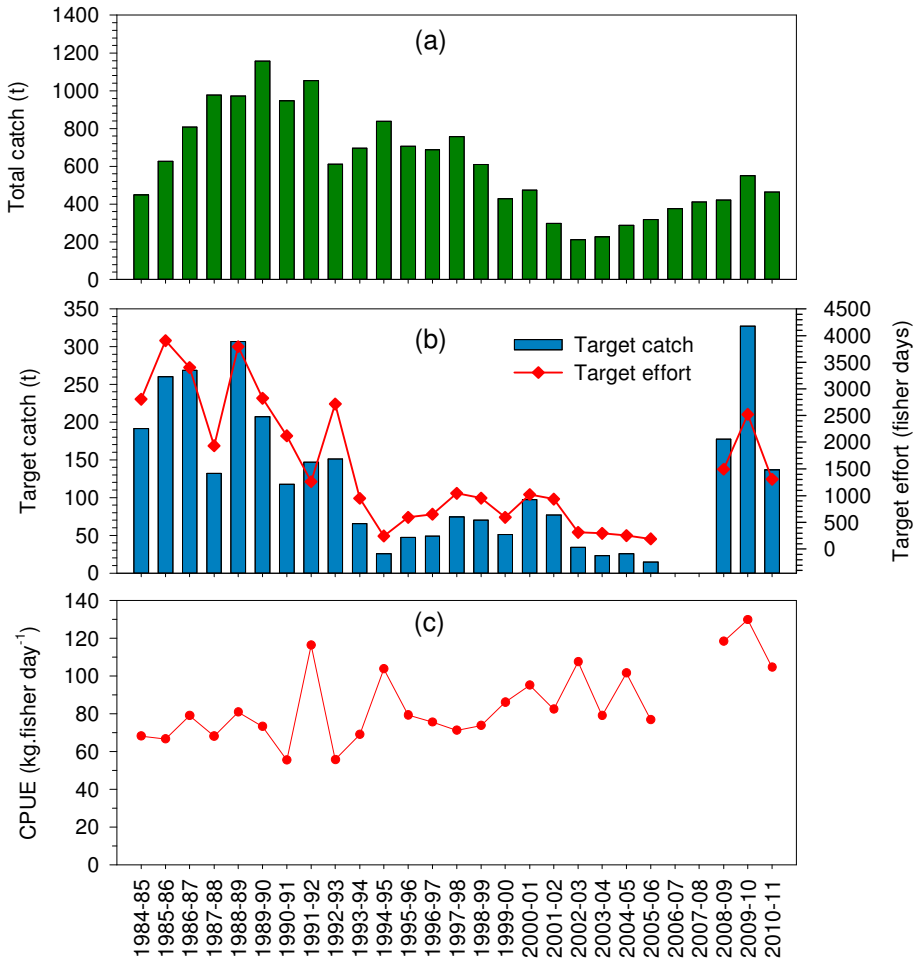

Figure 2-7. Inter-annual trends in catch and effort for bony bream between 1984-85 and 2010-11 showing: (a) total catch; and for large mesh gill nets; (b) target catch, target effort, and (c) CPUE. There was no effort targeted at bony bream between 2006-07 and 2007-08.

3 OTHER PERFORMANCE INDICATORS

The contribution to the total catch, for the years 2006-07 to 2010-11, by each of the key species is shown in Table 3-1. The contribution to the total catch of finfish species (excluding pipi) is shown in Table 3-2.

Table 3-1. Annual commercial catch composition (%) for the Lakes and Coorong Fishery between 2005-06 and 2009-10. The estimates for pipi and mulloway include catches from both the LCF and MSF.

Year	Black bream	Golden perch	Greenback flounder	Mulloway	Pipi	Yellow-eye mullet
	%	%	%	%	%	%
2006-07	0.3	11.3	0.4	3.7	10.5	73.9
2007-08	0.4	11.9	0.2	3.9	22.0	61.6
2008-09	0.2	10.8	0.2	4.2	26.1	58.5
2009-10	0.2	8.4	0.2	4.9	35.2	51.2
2010-11	0.4	10.6	0.0	3.5	38.3	47.2

Table 3-2. Annual commercial catch composition of finfish (%) for the South Australian Lakes and Coorong Fishery between 2005-06 and 2009-10. The estimate for mulloway includes catches from both the LCF and MSF.

Year	Black bream	Golden perch	Greenback flounder	Mulloway	Yellow-eye mullet
	%	%	%	%	%
2006-07	1.3	43.2	1.5	14.0	40.0
2007-08	1.1	31.0	0.5	10.1	57.3
2008-09	0.5	26.1	0.4	10.0	62.9
2009-10	0.4	17.2	0.3	10.0	72.1
2010-11	0.7	20.1	0.0	6.6	72.6

Net freshwater flow into the Coorong lagoons is also a PI in the Management Plan (Anon 2005). Mean annual flows (MSM BIGMOD, Murray-Darling Basin Commission) are shown in Figure 3-1. The RP associated with this PI is triggered when freshwater inflow is less than 500 GL.year^{-1} for four consecutive years as occurred between 2006-07 and 2009-10.

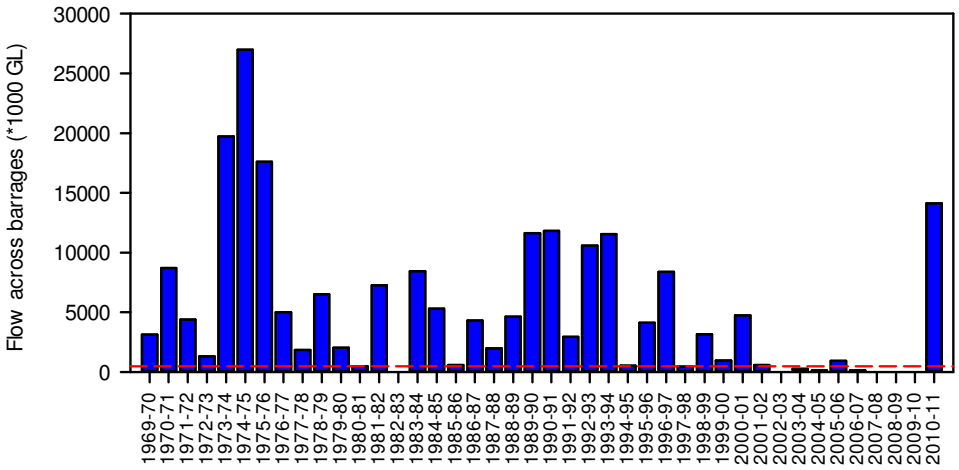

Figure 3-1. Mean annual flows across the Murray River Barrages into the Coorong lagoons between 1969-70 and 2010-11 (source MSM BIGMOD hydrological model, Murray Darling Basin Commission, November 2009). Red dashes indicate RP for net freshwater flow RP.

4 DISCUSSION

Of the 26 PIs for key species in the Lakes and Coorong Fishery in 2010-11 there were six below the lower RP (Tables 2-1, 2-3, 2-4, 2-5) and one that was above the upper RP (Table 2-6):

- Catch (t) for black bream was 23% below the lower RP;
- Catch (t) for greenback flounder was below the lower RP (catch not presented because <5 active licences);
- Catch (t) for mulloway was 29% below the lower RP;
- Catch (t) for pipi was 63% below the lower RP;
- CPUE (kg.day^{-1}) for pipi was 52% below the lower RP;
- 3-year total catch trend for pipi was 57% below the lower RP;
- CPUE (kg.fisher day^{-1}) of yellow-eye mullet was 9% above the upper RP;

The catch PI for pipi was affected by (i) the Total Allowable Commercial Catch of 330 t in 2010-11, and (ii) approximately 10% of catches were retained by licence holders for winter harvesting as part of an FRDC project. The CPUE PI for pipi may also have been affected by changes in fishing resulting from the reduction in quota. A recently developed fishery independent survey method provides a more robust index of relative biomass for pipi and should be incorporated as a PI in the management plan (Ward et al, 2010) which is due in June 2013.

In 2010-11 the greatest contribution to the total catch was from yellow-eye mullet (47%), with the second greatest from pipi (38%). From 2006-07 to 2010-11 the contribution of pipi to the total catch of all key species increased from 11% to 38%. During this period the contribution to total catches from yellow-eye mullet decreased from 74% to 47%.

When only catches of key finfish species were considered, they comprised in order of decreasing contribution; yellow-eye mullet (73%), golden perch (20%), mulloway (7%), greenback flounder (<1%) and black bream (<1%). From 2006-07 to 2010-11 the contribution to the total finfish catch by yellow-eye mullet increased, while contributions from golden perch and mulloway decreased.

Uncertainty around the PIs used to assess the performance of the fishery centres around several key areas. The most significant source of uncertainty around the PIs is the reliance on fishery-dependent data. The only estimate of relative abundance for each of the key finfish species is provided by estimates of CPUE from the

commercial fishery. Additionally, data on recreational catches are limited to several years i.e. 2000-01, 2007-08, and estimates are not available for all species in these years (Henry and Lyle 2003, Jones and Doonan 2005, Jones 2009). Biological information on reproduction, growth, mortality and population age structures for target species is limited. Finally the structure of the PIs and RPs within the Management Plan provide limited scope for accurate assessment. RPs are restricted to a fixed time period (Sloan 2005) and do not allow for the inclusion of data from later years. Further, the catch-trend and CPUE-trend PIs have widely separated upper and lower RPs that do not provide informative criteria for the accurate assessment of the species. Consequently, the assessment of these species would be improved through a review of these PI and RPs when the management plan is updated.

Definitive assessments of fish stocks based solely on changes in patterns of fishery-dependent measures of catch, effort and CPUE are problematic. Additional sources of information including a time series on the biological and demographic status of these stocks, particularly age structures, and estimates of growth and size at maturity would reduce the uncertainty in these assessments. This is essential for more accurate interpretation of trends in CPUE for mulloway, black bream, greenback flounder and golden perch.

Based on the assessment of specific PIs against the range of RPs defined in the Management Plan the status of pipi, black bream, mulloway, and greenback flounder are of greatest concern.

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